

UNITED STATES DEPARTMENT OF AGRICULTURE  
FOREST SERVICE

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Insect Control  
Lymphoc

Copy

August 1, 1929.

The Western Hemlock Infestation  
in the  
Olympic Peninsula, Washington  
In  
July, 1929  
and  
A Supplementary Statement  
of September 1, 1929.

M. J. Jaedicke,  
B. S. Bogart Benbow,  
Portland, Oregon.



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# OLYMPIC NATIONAL FOREST WASHINGTON



### Foreword

On July 13, 1929, the Milwaukee Land Company at Seattle, Washington reported to the Forest Service office at Portland that the western hemlock in the northern portion of the Olympic Peninsula was being defoliated by caterpillars and that considerable national forest timber was involved. The writer was assigned to make the field study.

On July 24, a meeting was held in the office of the Milwaukee Land Company at Seattle for a general discussion of the problem. The meeting was attended by the following:-

J. H. Bloedel, Bloedel Donovan Lumber Mills.  
C. A. Lyford and M. M. Deggeller of James D. Lacey and Co.  
C. B. Sanderson and A. C. Gabriel of the Milwaukee Land Company.  
C. S. Cowan, Washington Forest Fire Association.  
A. J. Jaenicke, U. S. Forest Service, Portland, Oregon.

The greatest concern of those present was whether or not the defoliation was due to the western hemlock looper (Elloptia ferridaria), an insect which caused a tremendous loss of timber in the Grays Harbor region in the early nineties and in Tillamook County, Oregon in 1919-1922.

It was agreed that the Washington Forest Fire Association should act as the clearing house for the timber owners for dissemination of information on this insect situation and to cooperate with the governmental agencies in following the progress of the defoliation.

### The Field Study

C. S. Cowan of the Washington Forest Fire Association and Dan McGillicuddy of James D. Lacey and Company and the writer spent a few days in the general region of Lake Crescent, Soleduck River, Ozette Lake, Clallam Bay and Bogachiel River. The writer wishes to express his special appreciation to Mr. McGillicuddy for his help in the study. His intimate knowledge of field conditions made it possible to secure a good deal of information in a short time. With the assistance of C. B. Crippen and Ben Northup of the State Forester's office,

the writer was able to see some of the forests in the Grays Harbor region. The period July 24-August 2 was spent in the study.

### The Findings

The results of the field study may be summarized as follows.-

A considerable part of the western hemlock in the area included within the red lines on the attached map has been defoliated. Only western hemlock is attacked. Both mature and immature timber have suffered. Even in the heaviest attacks, only one-half of the foliage has been destroyed. No hemlock has yet been killed. So far, the most serious aspect of the problem is the increase in the fire hazard on the approximately 150,000 acres in which the caterpillar invasion is concentrated. The insect responsible for the damage is not the western hemlock looper but is a bud-worm which is somewhat similar to the eastern spruce bud-worm in its general habits but of considerably less destructiveness. Whether any considerable quantity of hemlock is killed depends upon the abundance of the caterpillars in 1930 and 1931.

### The Area Involved

So far as is now known, the areas within the red lines on the attached map include all the seriously defoliated western hemlock on the Olympic Peninsula. Further field work may reveal other centers of heavy attack but they will undoubtedly prove to be of considerably lesser extent. Some caterpillars could be found almost anywhere in the Olympic Peninsula. They were seen by the writer in the Bogachiel River, in the Queets River, in the Lake Ozette region and in the Clearwater River and there are unconfirmed reports of the occurrence of the caterpillars in many other widely separated localities in the Olympic Peninsula. However, except for the epidemic area of about 150,000 acres indicated on the map, the writer did not find the caterpillars sufficiently abundant to cause more than a very slight and inconsequential injury to the foliage. In fact, it was only by careful examination of the foliage that the presence of caterpillars outside of the epidemic area could be detected. Because of the inaccessibility of much of the timber on the

Peninsula, it will be necessary to make a few airplane flights in August or in early September to get the location of other areas of heavy attack not known now. The discoloration of the needles is easily discernible from the air unless the country is smoky.

### The Damage

Careful examination of the western hemlock on the worst looking areas shows that only from one-fourth to one-half of the needles have been destroyed and that much of this loss is concentrated on the new growth where it is most evident to the eye. A great deal of the dead foliage still clings to the branches due to the loose webs which are spun by the caterpillars. Therefore, even after the needles are separated from the twigs by being gnawed off at the needle bases, they are loosely attached to the twigs and give the trees a much more sickly appearance than if the needles dropped to the ground as soon as they are gnawed off. Many of the buds were found uninjured.

With the advent of heavy rains in September and October, nearly all of these dead needles will be washed off and the trees will resume their normal green color. The more heavily defoliated trees will undoubtedly have a thin-foliaged appearance and some of the smaller hemlocks in the understory will lose their terminal leaders. So far, therefore, the most serious aspect of the problem is the increase in the fire hazard. The dead needles clinging to the branches of the young growth will serve, in case of a fire, as a lead to the crowns of the taller trees.

Whether or not there will be a continuation of caterpillar activity next year is purely a matter of conjecture and guess. It is evident that this is the first season of heavy feeding in the region by the caterpillars. Ordinarily, caterpillar invasions have lasted in case of other species in this region but two or three seasons and then brought to an end, quickly and effectively, by natural agencies such as diseases and beneficial insects. It is believed that the hemlock stand on the epidemic areas can withstand two more defoliations equal in severity to this first one without any appreciable loss of timber other than that of the young growth. Should there be a decided increase in the numbers of the caterpillars during the next two years, large hemlock trees will unquestionably be killed in large

numbers. However, such a serious situation does not seem likely to develop because of the fact that this species of caterpillar has not an established record for destructiveness in this region and because large outbreaks by a closely related species in the western hemlock forests of Alaska during the past ten years have not resulted in widespread timber loss.

In the Olympic Peninsula, only western hemlock is heavily attacked. Sitka spruce, Douglas fir and Amabilis fir occasionally have a few needles eaten by the caterpillars but the damage is so slight that it can be entirely disregarded. No injury whatever will be found in the extensive Douglas fir plantations in the Soleduck burn.

Both private and national forest timber are involved in this situation.

#### The Insect.

The positive determination of the fact that the western hemlock looper is not responsible for the defoliation is a matter of considerable encouragement to all those interested in the timber on the Olympic Peninsula. The hemlock looper has a bad record for timber destruction in western Washington. This fact, together with a recent outbreak of the looper near Vancouver, British Columbia, gave the timber interests in the Peninsula a real basis for alarm when caterpillars were reported to be numerous in the northern portion of the Peninsula.

The caterpillar now so prevalent in the Peninsula belongs to the same superfamily as the eastern spruce bud-worm but it is quite different from it in that the eastern spruce bud-worm in western forests is quite an indiscriminate feeder, attacking Douglas fir, hemlock, white fir, western larch, white pine, lodgepole pine, western cedar, etc. with equal ease, while the bud-worm under discussion confines its activity almost exclusively to western hemlock.

The hemlock bud-worm is not an insect which has been given careful study. As a consequence, very little that is definite and irrefutable can be given about its life history. The data about to be given are subject to subsequent revision by further study by the federal Bureau of Entomology. Apparently the eggs are laid in July and August by small grayish-brown moths which have a wing spread of hardly more

than one-half inch. Within two weeks after the eggs are laid, they hatch into caterpillars. These caterpillars tie together several needles with a loose web and do not do much feeding until the beginning of the growing season of the following year in May or June. They use the loose web and tied needles as a protection during the months of inactivity and during the feeding period. Most of the feeding and needle destruction take place during May, June and July. Beginning in July and lasting until sometime in August, the caterpillars change to pupae, small dark-brown objects, which are usually to be found in the compact hiding places which the caterpillars have made for their protection during the previous fall and winter and for hiding during the feeding period. The small moths develop from the pupae within two weeks.

The full grown caterpillars have green bodies, a brown head, and a black spot immediately back of the head. When fully developed, the caterpillars are about three-quarters of an inch in length. When disturbed, the caterpillars wriggle violently backwards into their hiding places or fall to the ground or descend slowly by silken threads.

The small caterpillars confine their feeding to the new growth. As they become older, they feed on the soft twig tissue, on the older needles and even on the cones.

The feeding of the caterpillars is now (August 1) nearly over for the year. The moths are already in flight and will continue to become more abundant until the middle of August. Eggs are now being laid. The caterpillars which will hatch from these eggs will do but little feeding until next spring. For this reason, most of the damage to the western hemlock timber is over for the year.

#### Feasibility of Control

Because of the widespread distribution of the caterpillar on tremendous areas, control work is not feasible. If the damaged area were restricted to a few thousand acres, the dusting of the trees with lead arsenate by airplanes might prove successful. Dusting from airplanes is now being used in British Columbia to combat a western hemlock looper outbreak, but only two or three thousand acres are to be treated in this way.

The hemlock bud-worm has not an established reputation as a very destructive pest and for this reason, as well as on account of its wide distribution, control measures do not seem warranted.

Recommendations

It is recommended that airplane flights over the Olympic Peninsula be made in August or early September, before the fall rains, to definitely locate possible epidemic areas not already known to exist.

It is recommended that this infestation be brought to the attention of the U. S. Bureau of Entomology for such research as that organization can make from its limited personnel and funds.

It is recommended that the progress of the attacks be followed cooperatively by the U. S. Forest Service, the Washington Forest Fire Association and the State Forester's office at Olympia.

*A. J. Jaenichen*

Supplementary Statement - September 5, 1929.

The insect which is the subject of this report has been definitely determined by specialists of the U. S. Bureau of Entomology to be Peronia variana Fernald. There is no generally accepted common name for this forest pest. Outbreaks of this caterpillar have been recorded in recent years in western hemlock in Alaska and British Columbia but no very large loss of hemlock has resulted in any of the cases under observation.

Since the previous sections of this report were written, a considerable quantity of the caterpillars and the pupae were confined in breeding cages. A number of moths were bred from this material but the most important development from this breeding work was the discovery of the fact that many of the pupae had been parasitized by an ichneumon-fly. This fly is frequently an important factor in bringing caterpillar invasions under control. Judging from the abundance of this parasite in the breeding material, it is more than likely that the present outbreak of the Peronea caterpillars in the Olympic Peninsula will subside before there has been any appreciable loss of hemlock timber.